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November 15, 2005

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APPLICATION NUMBER: *11/091,564*
FILING DATE: *March 28, 2005*
RELATED PCT APPLICATION NUMBER: *PCT/US05/10556*

THE COUNTRY CODE AND NUMBER OF YOUR PRIORITY APPLICATION, TO BE USED FOR FILING ABROAD UNDER THE PARIS CONVENTION, IS *US11/091,564*

Certified by

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Under Secretary of Commerce
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Patent and Trademark Office

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Monis Bangi and Michael R. Mooney

For: Hot-Fill Bottle Having Flexible Portions

EXPRESS MAIL LABEL NO: EV 324569934 US
DATE OF DEPOSIT: March 28, 2005

EV324569934US

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

PATENT APPLICATION TRANSMITTAL LETTER

Transmitted herewith for filing, please find:

☒ A Utility Application under 37 CFR § 1.53(b).

The above-identified application includes the following:

☐ A Request for Nonpublication

☒ A Specification including claims and abstract on pages 1 to 14.

☐ A copy of the specification including claims and abstract (pages -) and drawings and appendixes (if any) of earlier Application No. filed , to which no new matter has been added. Such earlier application is hereby incorporated into the present application by reference.

☒ A New Unexecuted Declaration or Oath and Power of Attorney.

☐ A New Executed Declaration or Oath and Power of Attorney.

☐ A copy of the executed oath or declaration filed in parent Application No. , filed on is attached.

☐ An Associate Power of Attorney executed by who is listed in the copy of the executed Declaration and Power of Attorney filed herewith.

PATENT

☐ A Copy of the Power of Attorney with Revocation filed in prior Application No.

☐ Signed Statement deleting inventor(s) named in the prior application.

☐ This application claims foreign priority under 35 U.S.C. § 119 of Application No. filed in (Country).

☐ A Certified Copy of each of the above applications for which priority is claimed:

☐ is enclosed.

☐ has been filed in prior Application No. filed .

☒ 10 Sheets of Formal Drawings and/or Photographs.

☒ Figure 1 should be published.

☒ Petition to Accept Color Photographs is enclosed.

☐ This continuation/divisional application is assigned of record to as evidenced by the assignment recorded on at Reel No. and Frame No. .

☐ A newly Executed Assignment transferring rights to .

☐ A Recordation Form Cover Sheet.

☐ Recordation Fee - $40.00.

☐ A Preliminary Amendment is enclosed .

☐ A Sequence Listing consisting of pages 1- .

☐ Diskette containing Sequence Listing is enclosed.

☐ The computer readable form in the above-identified application is identical with that filed in Application Number , filed . In accordance with 37 CFR § 1.821(e), please use the sequence listing filed on and received by the PTO on as the computer readable form filed in that application as the computer readable form for the instant application. It is understood that the Patent and Trademark Office will make the necessary change in application number and filing date for the computer readable form that will be used for the instant application.

☐ A paper copy of the Sequence Listing:

☐ was filed in the above-identified parent application on and received by the PTO on .

PATENT

☐ is included herewith in a separately filed preliminary amendment for incorporation into the specification.

☐ A Statement to Support Submission of Sequence Information is enclosed.

☒ Information Disclosure Statement including:

☒ Form 1449.

☐ Copies of References - listed on the attached Form PTO-1449.

☐ A copy of Petition for Extension of Time as filed in the prior case for copendency.

☐ Appended Material as follows: .

☒ Return Receipt Postcard (should be specifically itemized).

FEE CALCULATION:

☐ Applicant(s) by its/their undersigned attorney, claims small entity status under 37 CFR § 1.27 as *(CHOOSE ONE: an Independent Inventor, a Small Business Concern, or a Nonprofit Organization).*

			SMALL ENTITY		NOT SMALL ENTITY	
			RATE	FEE	RATE	FEE
UTILITY APPLICATION BASE FEE			$150.00		$300.00	300.00
UTILITY EXAMINATION FEE			$100.00		$200.00	200.00
UTILITY SEARCH FEE			$250.00		$500.00	500.00
UTILITY APPLICATION SIZE FEE			$125.00 for each additional 50 pages over the first 100		$250.00 for each additional 50 pages over the first 100	0
UTILITY APPLICATION; ALL CLAIMS CALCULATED AFTER ENTRY OF ALL AMENDMENTS						
	No. Filed	No. Extra				
TOTAL NO. OF CLAIMS	25- 20 =	5	$25 each		$50 each	250.00
NO. OF INDEPENDENT CLAIMS	3- 3 =	0	$100 each		$200 each	0
MULTIPLE DEPENDENT CLAIM FEE			$180		$360	0
ADDITIONAL FILING FEE						0
TOTAL FILING FEE DUE						1250.00

☒ A Check in the amount of **$1250.00** is attached. Please charge any deficiency or credit any overpayment to Deposit Account No. 23-3050.

PATENT

☐ Please charge Deposit Account No. 23-3050 in the amount of **$ .00**. This sheet is attached in duplicate.

☒ The Commissioner is hereby requested to grant an extension of time for the appropriate length of time, should one be necessary, in connection with this filing or any future filing submitted to the U.S. Patent and Trademark Office in the above-identified application during the pendency of this application. The Commissioner is further authorized to charge any fees related to any such extension of time to Deposit Account No. 23-3050. This sheet is provided in duplicate.

☒ **Address all correspondence to Customer No. 23377.**

SHOULD ANY DEFICIENCIES APPEAR with respect to this application, including deficiencies in payment of fees, missing parts of the application or otherwise, the United States Patent and Trademark Office is respectfully requested to promptly notify the undersigned.

Date: March 28, 2005

Andrew J. Hagerty
Registration No. 44,141

3-29-05

DOCKET NO.: CNST-3580 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Monis Bangi and Michael R. Mooney **Confirmation No.: Not Yet Assigned**

Application No.: Not Yet Assigned **Group Art Unit: Not Yet Assigned**

Filing Date: Herewith **Examiner: Not Yet Assigned**

For: Hot-Fill Bottle Having Flexible Portions

EXPRESS MAIL LABEL NO: EV 324569934 US
DATE OF DEPOSIT: March 28, 2005

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PETITION TO ACCEPT COLOR DRAWING(S)/PHOTOGRAPH(S)
(37 CFR § 1.84 (a)(2) and(b)(2))

Petition is hereby made to accept drawing(s)/photograph(s) in this case. Figures 6 and 7 are graphical, calculated depictions of stresses formed in one preferred container embodiment as a result of a hot-filling process. Figure 8 is a graphical, calculated depiction of deformation formed in the preferred embodiment as a result of the hot-filling process. Magnitudes of stress and deformation of the container are shown with varying color that corresponds to the color scale included with each of the figures. Color is believed necessary for viewing subtle differences in stress/deformation between various regions of the container.

Three (3) sets of color drawing(s)/photograph(s) are enclosed, comprising Figure(s) **6, 7, and 8**.

The first paragraph contains the following:

The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

The petition fee (37 CFR § 1.17(h)) is paid as follows:

☒ A check in the amount of **$130.00** is attached.

☐ Please charge Deposit Account No. 23-3050 in the amount of **$130.00**. This sheet is attached in duplicate.

☒ The Commissioner is hereby authorized to charge any deficiency or credit any overpayment of the fees associated with this communication to Deposit Account No. 23-3050.

Date: March 28, 2005

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HOT-FILL BOTTLE HAVING FLEXIBLE PORTIONS

[0001] The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

CROSS REFERENCE TO RELATED APPLICATIONS

[0002] This application claims the benefit of Unites States Provisional Application No. 60/558,790, which was filed on April 1, 2004 and is incorporated herein by reference.

FIELD OF THE INVENTION

[0003] This invention relates to containers, and more particularly to hot fillable containers having flexible portions to absorb vacuum.

BACKGROUND OF THE INVENTION

[0004] Perishable beverage and food products are often placed into containers at elevated temperatures. In a conventional hot-fill process, the liquid or flowable product is charged into a container at elevated temperatures, such as 180 to 190 degrees F, under approximately atmospheric pressure. Because a cap hermetically seals the product within the container while the product is at the hot-filling temperature, hot-fill plastic containers

are subject to negative internal pressure (that is, relative to ambient pressure) upon cooling and contraction of the products and any entrapped air in the head-space.

[0005] It has been a goal of conventional hot-fill container design to form stiff cylindrical portions (in transverse cross section) that maintain a cylindrical shape upon cooling. Thus, conventional hot-fill containers include designated flexing portions -- vacuum panels -- that deform when subject to typical hot-fill negative internal pressures. The inward deflection of the vacuum panels tends to equalize the pressure differential between the interior and exterior of the container – that is, absorb vacuum -- so as to enhance the ability of the cylindrical sections to maintain an attractive shape, to enhance the ease of labeling, or like commercial appeal. Some container designs are symmetric about a longitudinal centerline and designed with stiffeners to maintain the intended cylindrical shape while the vacuum panels deflect. For example, United States Patent Numbers 5,178,289, 5,092,475, and 5,054,632 teach stiffening portions or ribs to increase hoop stiffness and eliminate bulges while integral vacuum panels collapse inwardly. United States Patent Number 4,863,046 is designed to provide volumetric shrinkage of less than one percent in hot-fill applications.

[0006] Other containers include a pair of vacuum panels, each of which has an indentation or grip portion enabling the container to be gripped between a user's thumb and fingers. For example, United States Patent Number 5,141,120 teaches a bottle having a hinge continuously surrounding a vacuum panel, which includes indentations for gripping. In response to cooling of the container contents, the hinge enables the entire vacuum panel to collapse inwardly. United States Patent Number 5,141,121 similarly teaches a bottle having an outward bulge that inverts in response to cooling of the container contents. Each of the patents referred to herein by patent number is incorporated by reference in its entirety.

[0007] It has been observed that for some containers undergoing vacuum conditions, inward deflection of portions of the container, such as panels, causes regions circumferentially spaced apart from the panels to deflect outwardly. For example, some containers having opposing handgrips, which may tend to deflect inwardly upon vacuum conditions, have label panels that may deflect outwardly under vacuum conditions.

[0008] Also, some containers are subject to creasing. For example, edges of a flex panel may locally bulge outwardly after hot-filling, which is unattractive.

SUMMARY OF THE INVENTION

[0009] In accordance with one preferred embodiment of the present invention, there has now been provided a hot-fillable container including a neck portion, an enclosed bottom portion and a body portion disposed between the neck portion and the bottom portion. The body portion has flex panels disposed about the circumference of the body portion. The flex panels include a recessed central panel and a rim extending along a periphery of the central panel. The central panels are capable of inward deflection in response to the hot-filling process. A support structure fields is interposed between adjacent flex panels, and is also capable of inward deflection in response to the hot-filling process. The support structure field includes non-vertical ribs that abut one another along at least a portion of their length. At least some of the non-vertical ribs includes opposing ends that terminate at the rim of an adjacent flex panel.

[0010] In accordance with another preferred embodiment provided by the present invention, there has now been provided a hot-fillable container including a neck portion, an enclosed bottom portion and a body portion disposed between the neck portion and the bottom portion. The body portion includes a flex portion that has a plurality of spaced apart flex panels circumferentially disposed about the body portion and a support structure field interposed between adjacent flex panels. The support structure field includes a series of non-vertical ribs that abut one another along at least a substantial portion of their lengths so as to define non-vertical hinges that are capable of facilitating radial deflection of the support structure field.

[0011] In accordance with yet another preferred embodiment of the present invention, there has now been provided a hot-fillable container including a neck portion, an enclosed bottom portion and a body portion disposed between the neck portion and the bottom portion. The body portion includes a flex portion that has a plurality of spaced apart flex panels and ribbed regions. The maximum magnitude of radially inward deflection of a central panel of each of the flex panels is substantially equivalent to the maximum magnitude of raidally inward deflection of each of the ribbed regions in response to a pressure differential of about 5 psi between an exterior and interior of the container.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Figure 1 is a perspective view of a container;

[0013] Figure 2 is a side view of the container of Figure 1;

[0014] Figure 3 is a longitudinal cross sectional view of the container of Figure 2 taken through line 3-3;

[0015] Figure 4A is a cross sectional view normal to the longitudinal cross sectional view taken through line 4A-4A;

[0016] Figure 4B is a cross sectional view normal to the longitudinal cross sectional view taken through line 4B-4B;

[0017] Figure 4C is a cross sectional view normal to the longitudinal cross sectional view taken through line 4C-4C;

[0018] Figure 5A is a schematic view of an alternative embodiment of a portion of the container of Figure 1;

[0019] Figure 5B is a schematic view of an alternative embodiment of a portion of the container of Figure 1;

[0020] Figure 5C is a schematic view of an alternative embodiment of a portion of the container of Figure 1;

[0021] Figure 5D is a schematic view of an alternative embodiment of a portion of the container of Figure 1;

[0022] Figure 6 is a (calculated) graphical depiction of the stresses formed in the container of Figure 1 as a result of a conventional hot-filling process;

[0023] Figure 7 is an enlarged view of the graphical depiction of Figure 5;

[0024] Figure 8 is an enlarged (calculated) graphical depiction of the deformation formed in the container of Figure 1 as a result of a conventional hot-filing process.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[0025] A container 10 suitable for hot-filling includes a neck portion 12, a bottom portion 18, and a body portion 22. As best shown in Figures 1 and 2, neck portion 12 includes a finish 14 for receiving a closure (shown schematically in Figure 2) and a dome 16. Preferably, container 10 is for holding a beverage, although container 10 and the principles disclosed herein may be employed for containers of any variety and for any product. Preferably, container 10 is formed of any plastic suitable for hot-filling, including, for example, polyethylene terephthalate (PET), polybutylene terephthalate (PBT), polyethylene naphthalate (PEN), or a blend comprising the same. A perform can be made by injection molding the plastic into an injection mold. The perform is then

stretched and blown into a shaped blow mold to form a container. The present invention is not limited to the above-listed exemplary materials or processes.

[0026] Bottom portion 18 includes a heel 19 that extends downwardly from body portion 22 to a standing ring 20. A base 21, as shown in Figure 3, is a reentrant portion that extends inwardly and upwardly from standing ring 20. The present invention encompasses employing any type or configuration of finish 14, dome 16, heel 19, standing ring 20, and base 21. Preferably, dome 16 is suitable for receiving a label, such as a shrink-wrapped label 17a shown schematically in Figure 2.

[0027] Body portion 22 preferably includes a label portion 24 and a separate flex portion 26. Body portion 22 is essentially separated from dome 16 by a deep, circumferential groove 28 that provides hoop strength to the surrounding region. A label 17b, as partially schematically indicated in Figure 2, preferably wraps around the circumference of label portion 24.

[0028] Label portion 24 preferably has a round cross section that is interrupted only by circumferential ribs 30 that provide hoop strength to the label portion 24. Circumferential ribs 30 are not required to be as deep as groove 28, although the present invention is not limited to any particular relationship between groove 28 and ribs 30, or even to existence of such groove and ribs. Label 17b preferably, for aesthetic reasons, covers circumferential ribs 30.

[0029] Flex portion 26 preferably is disposed below label portion 24 to facilitate ease of labeling and gripping. Preferably, flex portion 26 is not covered with a label. Flex portion 26 includes plural flex panels 34 and support structure fields 36. Preferably, container 10 has at least three flex panels (as shown in the figures) although the present invention encompasses employing any number of flex panels according the particular parameters of the application (such as bottle diameter, wall thickness, hot-filling conditions, desired vacuum absorption, and the like).

[0030] Each flex panel 34 includes a rim 40, a central panel 42, and a recess sidewall 44. Rim 40 preferably comprises a pair of opposing lateral rims 46a and 46b, a top rim 48a, and a bottom rim 48b. Preferably, rim components 46a, 46b, 48a, and 48b are continuous, and formed by a thin, uniform strip or border.

[0031] Recess sidewall 44 preferably comprises a pair of opposing lateral recess walls 50a and 50b that extend from opposing edges of central panel 42 to lateral rims 46a and 46b, respectively. Similarly, a top recess wall 52a and a bottom recess wall 52b

extend between top and bottom edges of central panel 42 to top rim 48a and bottom rim 48b, respectively.

[0032] Central panel 42 preferably is substantially flat in its as-molded state, and has rounded corners. Accordingly, rim 40 and recess sidewall 44 have rounded corners to essentially match the outline of central panel 42. Preferably, the plane of central panel 42 is parallel to the longitudinal axis of container 10. Such orientation, while not essential, enables lateral recess walls 50a and 50b to be approximately uniform in radial dimension, which may enhance the reinforcing function of recess sidewall 44.

[0033] Support structure field 36 preferably spans between rims 40 of adjacent flex panels 34, and includes non-vertical supports, such as flex area ribs 56. As shown in the figures, ribs 56 may be formed by multiple concave (as viewed from inside container 10) outer portions 58, each of which has an upper and lower inwardly directed end 60. An end 60 of one rib 56 joins an end 60 of an adjacent rib 56 at a ridge 62.

[0034] Preferably, at least some of the circumferential ends of flex area ribs 56 are disposed proximate to or in contact with lateral rims 46a, 46b of flex panel 34. Such configuration may support lateral rims 46a, 46b and may prevent deformation of rims 46a, 46b under vacuum conditions, and may also inhibit creasing. Such configuration is not essential – rather, the present invention encompasses any configuration set forth in the claims.

[0035] Flex ribs 56 are illustrated in the figures as a series of concave portions 58. The invention is not limited to such configuration of ribs, but rather encompasses any non-vertical structure, such as ribs that are oriented other than horizontally. For example, Figures 5A, 5B, 5C, and 5D illustrate alternative embodiments of a pattern of supports within support structure field 36. Such structure is designated as support structures 37a, 37b, 37c, and 37d, respectively. Figure 5A schematically shows support structure 37a: a central circle or island with arcuate ribs disposed above and below. Figure 5B schematically shows support structure 37b: undulating ribs. Figure 5C schematically shows support structure 37c: arcuate ribs, which may be oriented to open downwardly. Alternatively, the arcuate ribs may open upwardly (not shown in the Figures). Figure 5D schematically shows support structure 37d: obliquely oriented ribs that are substantially straight or rectilinear in elevational view (although the oblique ribs will, of course, curve with the circumference of the container).

[0036] The flex ribs shown in the figures are not vertical, or, where the ribs are not rectilinear, the longitudinal center line or best fit line through the planar projection of

the rib is not vertical. The non-vertical structure of the ribs and spaces between ribs enhance the ability of the support structure field to bend relative to a horizontal axis even while such ribs will enhance hoop stiffness of the support structure field 36, 37a, 37b, 37c, or 37d. In this regard, the ribs of support structure field 36, 37a, 37b, 37c, or 37d stiffen such support structure field from flexing in a horizontal plane or about a vertical axis.

[0037] Figures 4A, 4B, and 4C illustrate aspects of the function of the preferred container 10. The solid lines illustrate the cross sections in the as-molded state, and the dashed lines schematically indicate the cross sections on container 10 under conventional vacuum conditions created by filling the product (not shown) at approximately 185 degrees F and then capping container 10 and allowing it to cool to room temperature. In Figures 4A , 4B, and 4C, a solid double line in the region of the flex area ribs 56 shows both concave outer portion 58 and ridge 62 as solid lines, and omits the cross sectional cross-hatching for clarity. For clarity, deformation is indicated by a single dashed line 56' is this region. Dashed line 42' indicates deformation of central panel 42 of flex panel 34.

[0038] Central panels 42 of the flex panels 34 deform inwardly, as expected. As best shown in Figure 4B, the centers of the regions between the flex panels (that is, in support structure field 36) also deflect inward to absorb vacuum. Figure 4A, which shows the cross section near an upper end of flex portion 26, shows a relatively small magnitude of inward deflection upon vacuum. Similarly, Figure 4C, which shows the cross section near a lower end of flex portion 26, also shows a relatively small magnitude of inward deflection upon vacuum. Preferably, and in order to enhance the total magnitude of vacuum absorption, the magnitude of maximum inward deflection of central panel 42 is approximately the same as the magnitude of maximum inward deflection of support structure field 36. Such relative magnitudes are not essential, and the present invention encompasses any relative magnitudes of inward deflection (or even no inward deflection of the support structure fields), according to the language of the claims. It should be understood that the deflection shown by broken lines is for illustration purposes only. Actual deflection may vary in relative magnitude, geometry and/or uniformity.

[0039] The functional aspects of container 10 are further illustrated in Figures 6, 7, and 8. Figures 6 and 7 graphically show calculated von Mises stress for container 10 based on a geometric non-linear analysis using 2-D shell elements. Von Mises stress at each point is an averaged stress value calculated by adding the squares of the 3 component stresses (X, Y and Z directions) and taking the square root of their sums.

Container 10 was mathematically analyzed as a full bottle without the finish and restrained at the top surface.

[0040] Stresses were calculated based on a 5 psi vacuum. The temperature variation under vacuum performance was ignored. The wall thickness of container 10 was assumed to be 0.015 inches uniform throughout container 10, except the neck and base 21, which were presumed to be 0.050 inches thick. As best shown in Figure 7, lateral recess sidewalls 50a and 50b undergo the greatest magnitude of von Mises stress under vacuum conditions, thereby (among other things) providing stiffening and inhibiting creasing of lateral rims 48a and 48b, respectively. Ridges 62 undergo higher stress than does concave outer portion 58 of flex area ribs 56.

[0041] Figure 8 illustrates calculated deformation based on the same conditions as the calculated stresses of Figures 6 and 7. In general agreement with the stresses shown in Figure 7, central panel 42 bows inwardly, with the greatest magnitude of deformation occurring in its center.

[0042] As best shown in Figure 8, lateral recess sidewalls 50a and 50b and lateral rims 46a and 46b function as stiffeners relative to central panel 42. Also, top and bottom recess sidewalls 52a and 52b and top and bottom rims 48a and 48b act as stiffeners relative to central panel 42.

[0043] Accordingly, because the support structure field 36 undergoes inward deflection in addition to the inward deflection of the center panel 42 of flex panel 34, vacuum absorption is enhanced. The label panel portion is stiffened by ribs 30, and generally retains its circular shape to enhance labeling and appearance.

[0044] The present invention is illustrated with respect to a preferred embodiment, and the present invention is not limited to the particular structure described in the preferred embodiment of container 10. For example, the present invention encompasses a container in which a label panel (such as label portion 24 of container body 22) undergoes some deformation under vacuum conditions, becomes out-of-round under vacuum conditions, and/or is not circular in its as-molded state – even though such structure or function is not shown in the figures.

[0045] Furthermore, it is not essential that the container have separate flex portions 26 and label portions 24. For example, the present invention encompasses the body portion 22 of container 10 or (other body configuration of other container covered by the appended claims) being covered by a label (such configuration not shown in the figures). The non-mechanical and subjectively attractive appearance of body portion 22

renders it suitable for use without a label, and the flex panels 34 disposed about the circumference of container 10 enhance gripping, but such advantages are optional.

[0046] It is understood that persons familiar with hot-fill container technology will recognize additional advantages and features that flow from the present disclosure, and the present invention encompasses such additional advantages and features such that the scope of the invention is limited only by the claims.

What is Claimed:

1. A hot-fillable container formed by blow molding, said container comprising:

a neck portion;

an enclosed bottom portion; and

a body portion disposed between the neck portion and the bottom portion, the body portion including:

flex panels disposed about the circumference of the body portion, each of which includes a recessed central panel and a rim extending along a periphery of the central panel, the central panels being capable of inward deflection in response to the hot-filling process; and

a support structure field interposed between adjacent flex panels, the support structure field including a series of non-vertical ribs that abut one another along at least a portion of their lengths, at least some of the non-vertical ribs including opposing ends that terminate at the rim of an adjacent flex panel, wherein the support structure field is capable of inward deflection in response to the hot-filling process.

2. The container of claim 1, wherein the stiffness of the support fields is greater about its vertical axis than about its horizontal axis.

3. The container of claim 1, wherein each flex panel comprises opposing lateral recess walls extending between the central panel and the rim.

4. The container of claim 3, wherein a central panel hinge portion is formed in the recess walls.

5. The container of claim 1, wherein transverse hinges are defined at an interface between adjacent non-vertical ribs, the transverse hinges diminish stiffness of the support structure field about a vertical axis.

6. The container of claim 5, wherein the ribs are substantially horizontal such that the transverse hinges are horizontal.

7. The container of claim 1, wherein said flex panels are at least three flex panels disposed approximately equidistant about a circumference of the container.

8. The container of claim 1 wherein the body portion includes a circumferential label portion disposed generally above the flex panels and the support structure field.

9. The container of claim 1 wherein the maximum magnitude of inward deflection of each of the central panels is approximately the same as that of the support structure field under vacuum conditions.

10. The container of claim 1, wherein at least some of the non-vertical ribs are concave as viewed from inside the container.

11. A hot-fillable container formed by blow molding, the container comprising:

a) a neck portion;

b) an enclosed bottom portion; and

c) a body portion disposed between the neck portion and the bottom portion, the body portion including a flex portion comprising:

i) a plurality of spaced apart flex panels circumferentially disposed about the body portion, each of the plurality of flex panels including a central panel; and

ii) a support structure field interposed between adjacent flex panels, the support structure field including a series of non-vertical ribs that abut one another along at least a substantial portion of their lengths so as to define non-vertical hinges that are capable of facilitating radial deflection of the support structure field.

12. The container of claim 11, wherein the stiffness of the support structure field is greater about its vertical axis than about its horizontal axis, and wherein the support structure field is capable of inward deflection in response to the hot-filling process.

13. The container of claim 11, wherein each of the flex panels include a pair of opposing lateral rims extending at least along sides of the flex panel, and a pair of opposing lateral recess walls extending between the central panel and the opposing lateral rims.

14. The container of claim 13, wherein each of the flex panels further includes a top and a bottom rim that merge into the opposing lateral rims and a top and a bottom recess wall extending between the central panel and the top and the bottom rim.

15. The container of claim 14, wherein the rims and recess walls are continuous around the perimeter of the central panel.

16. The container of claim 13, wherein each of the opposing lateral rims merge with at least some of the non-vertical ribs.

17. The container of claim 11, wherein at least some of the series of non-vertical ribs are concave as viewed from inside the container.

18. The container of claim 11, wherein a maximum magnitude of radially inward deflection of each of the central panels is approximately the same as that of the support structure field in response to a container negative internal pressure.

19. The container of claim 11, comprising three flex panels and three support structure fields.

20. A hot-fillable container formed by blow molding, the container comprising:

a) a neck portion;

b) an enclosed bottom portion; and

c) a body portion disposed between the neck portion and the bottom portion, the body portion including a flex portion comprising:

i) a plurality of spaced apart flex panels circumferentially disposed about the body portion, each of the plurality of flex panels including a central panel;

ii) a plurality of spaced apart ribbed regions circumferentially disposed about the body portion, each one of the plurality of ribbed regions interposed between adjacent flex panels and including a series of flex ribs;

wherein the maximum magnitude of radially inward deflection of each of the central panels is substantially equivalent to the maximum magnitude of radially inward deflection of each of the ribbed regions in response to a pressure differential of about 5 psi between an exterior and an interior of the container.

21. The container of claim 20, wherein each one of the ribs in the series of flex ribs is oriented in a non-absolute vertical orientation.

22. The container of claim 20, wherein each one of the ribs in the series of flex ribs is concave as viewed from inside the container.

23. The container of claim 20, wherein the flex ribs abut one another.

24. The container of claim 20, wherein a rim extends continuously around the perimeter of each of the central panels.

25. The container of claim 24, wherein opposing ends of the flex ribs that terminate at an adjacent rim.

ABSTRACT

A flexible hot fill container includes a body having a label portion and a flex portion. The flex portion includes flex panels and support structure fields. Both the support structure fields and flex panels deform inwardly upon vacuum conditions. Recess sidewalls in the flex panels provide support.

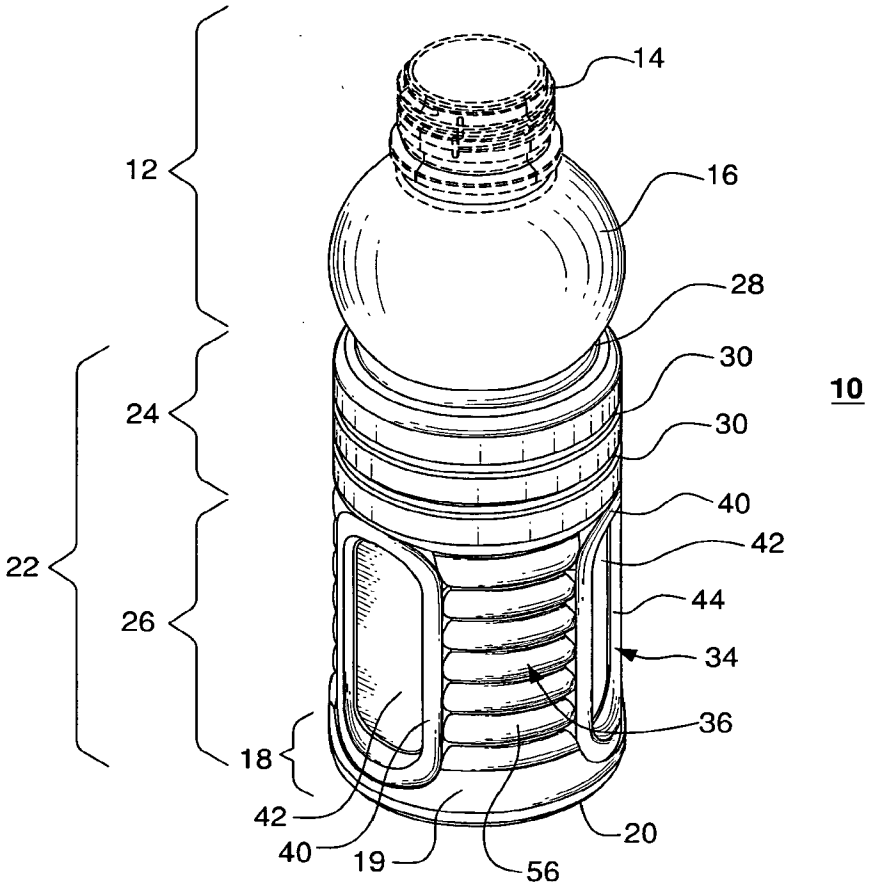

FIG. 1

Filed: Herewith
Phone: (215) 568-3100

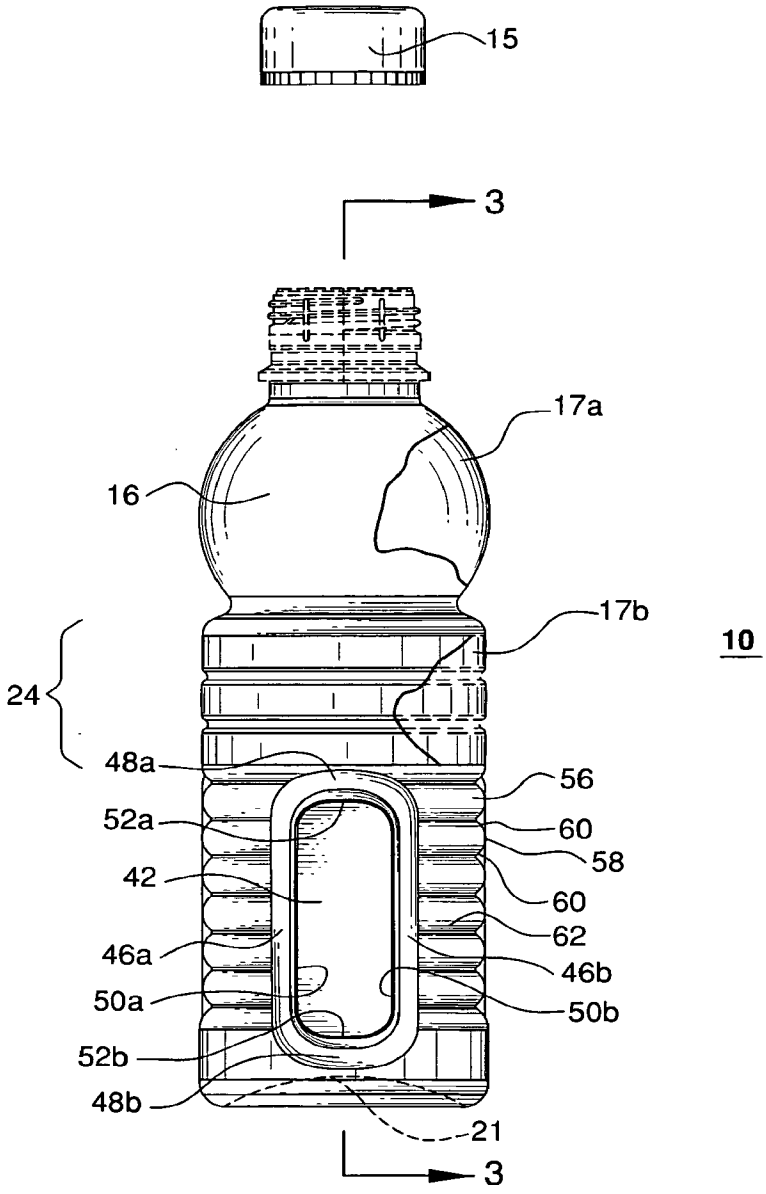

FIG. 2

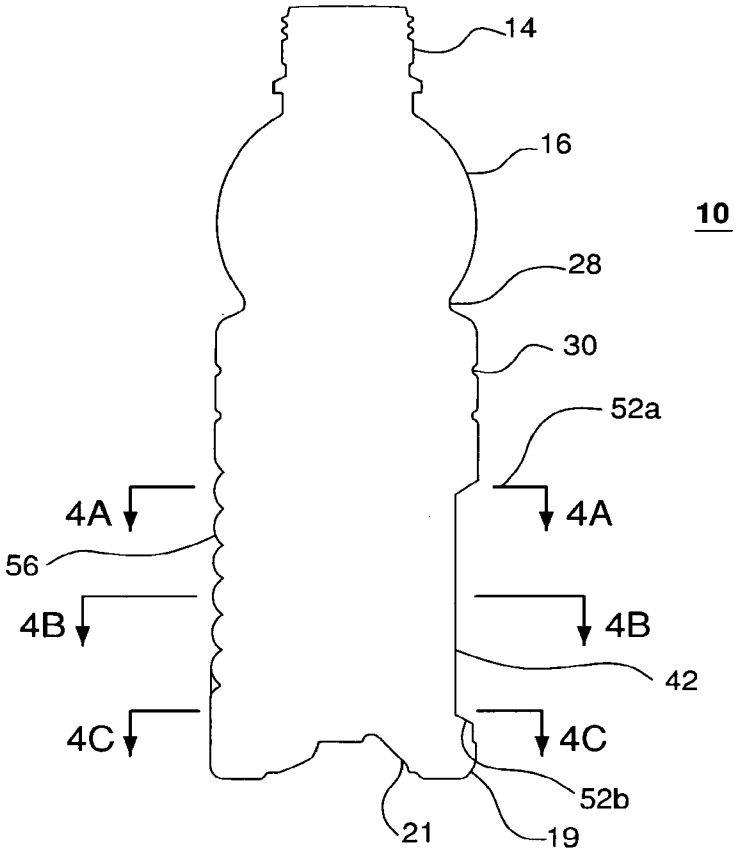

FIG. 3

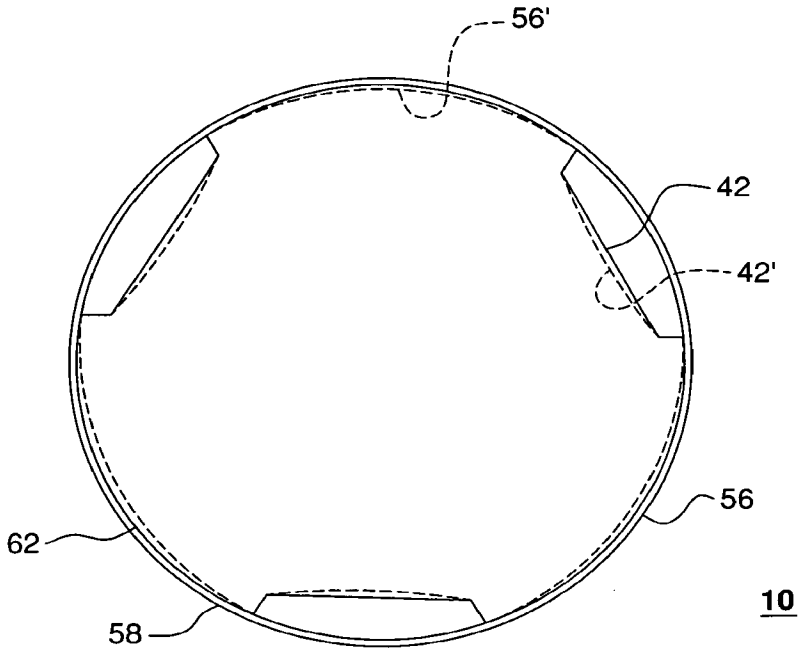

FIG. 4A

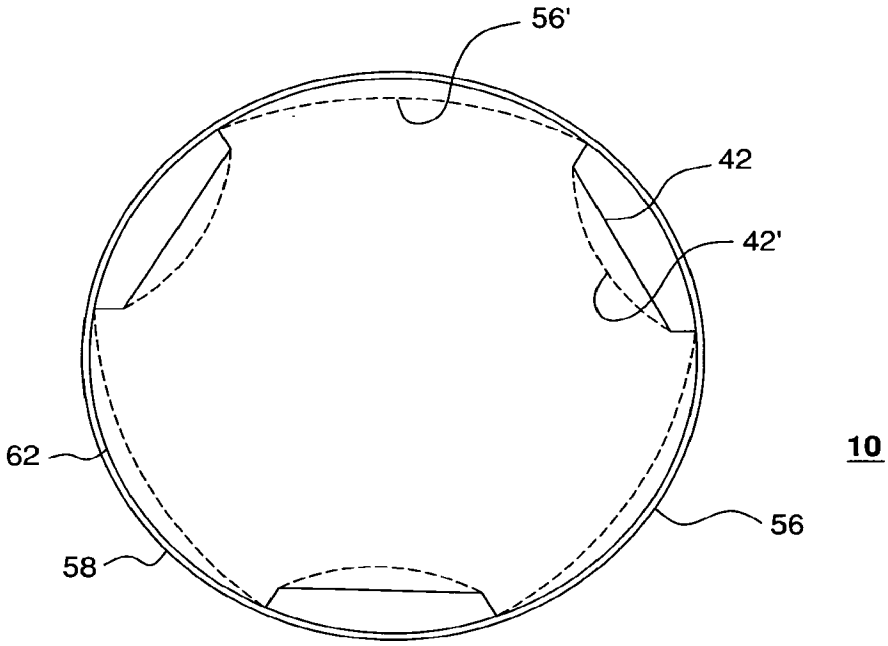

FIG. 4B

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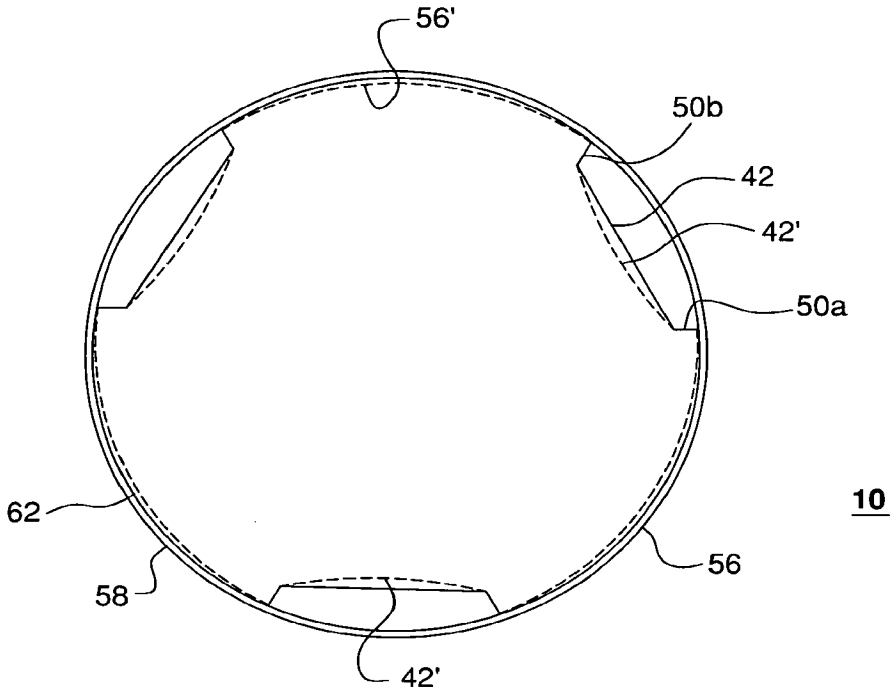

FIG.4C

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Phone: (215) 568-3100

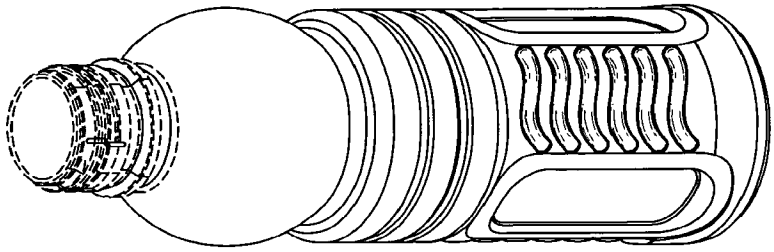

FIG. 5B

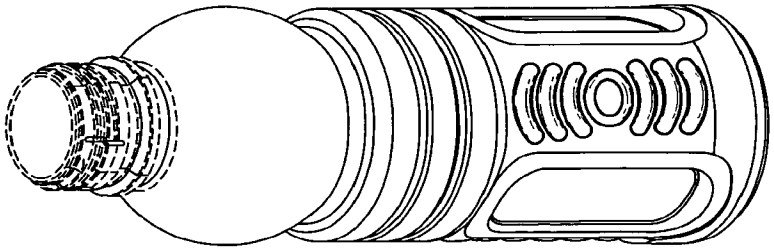

FIG. 5A

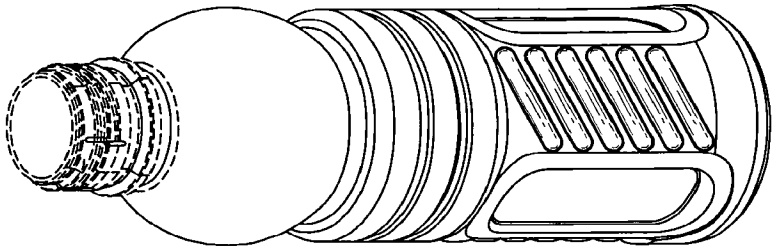

FIG. 5D

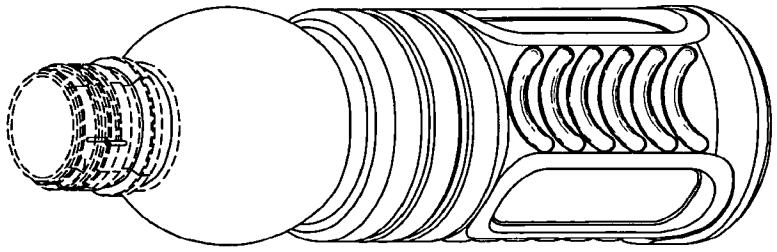

FIG. 5C

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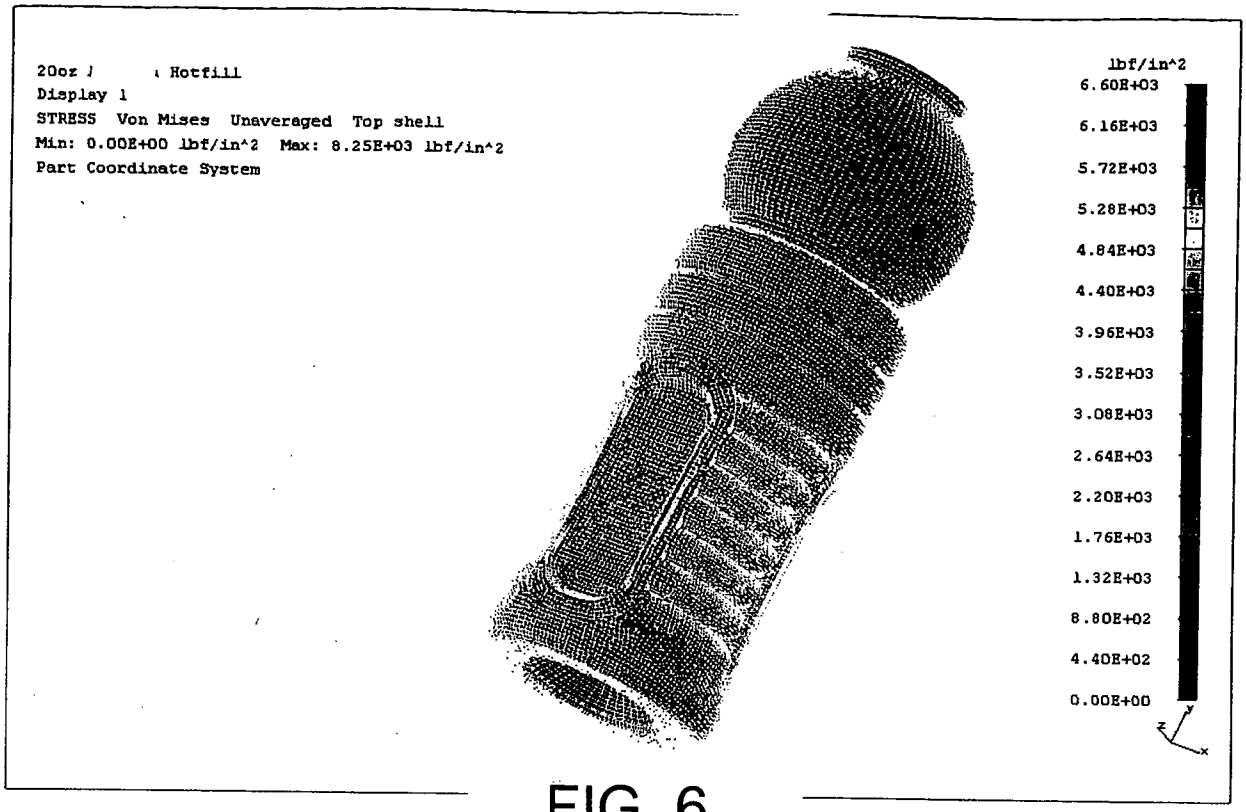

FIG. 6

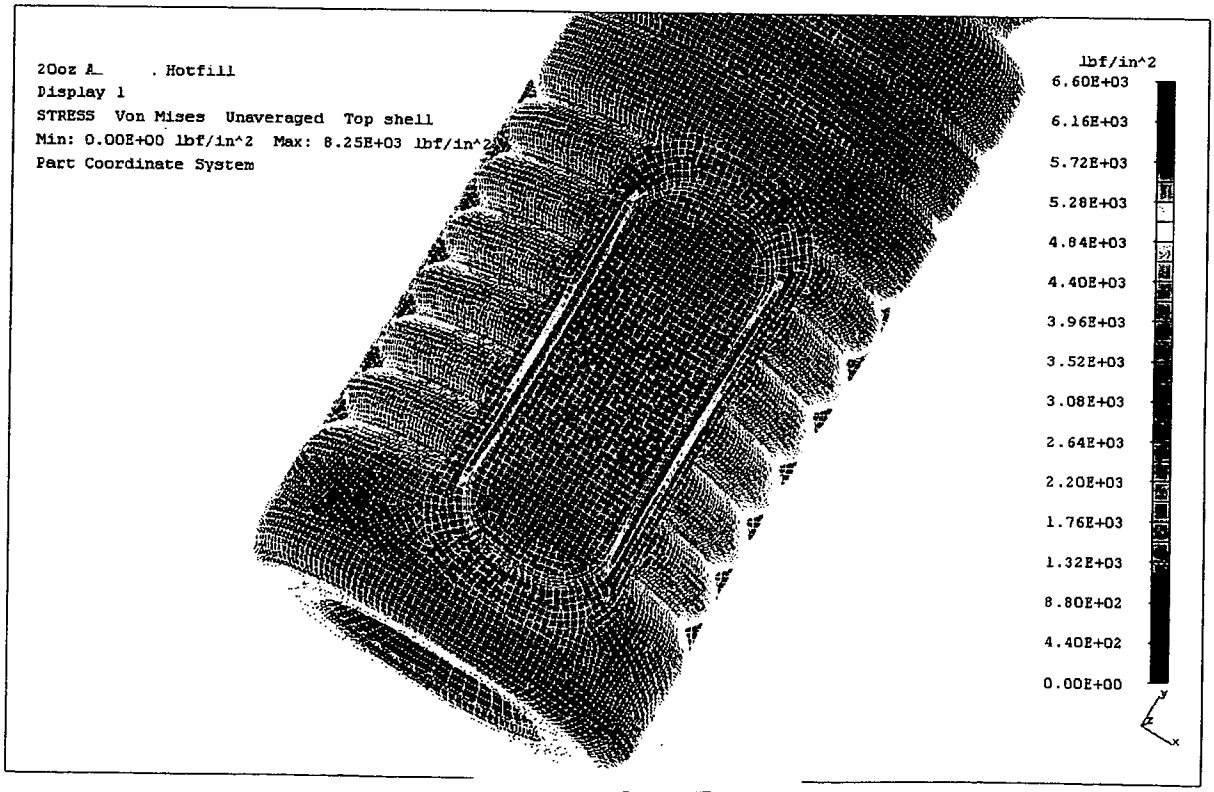

FIG. 7

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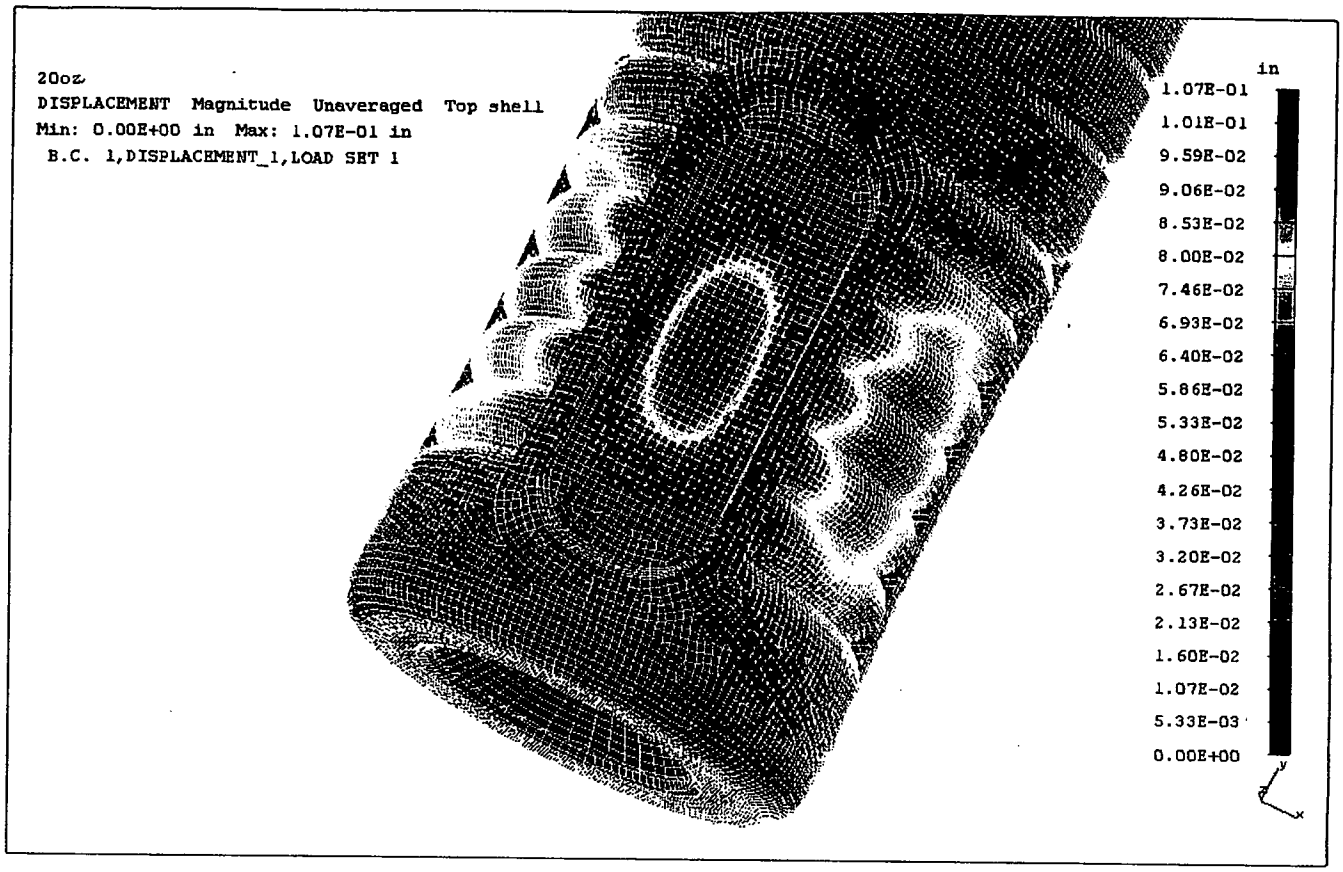

FIG. 8

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Monis Bangi, Michael R. Mooney

For: Hot-Fill Bottle Having Flexible Portions

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

This declaration is directed to:

☒ The attached application,

☐ Application No. , filed on , as amended on (if applicable);

☐ was described and claimed in PCT International Application Number , filed on and as amended under PCT Article 19 on and/or PCT Article 34 on .

I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the above-captioned application.

I have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment referred to above;

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be material to patentability as defined in 37 CFR § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT International filing date of the continuation-in-part application.

I hereby appoint all the practitioners associated with Customer Number 23377 to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith. Each practitioner associated with Customer Number 23377 is an attorney or agent registered before the United States Patent and Trademark Office.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Inventor's signature: _____

Date: _____

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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Date: _____

Application Data Sheet

Application Information

Application number:	Not yet assigned
Filing Date:	Herewith
Application Type:	Regular
Subject Matter:	Utility
Suggested Classification:	
Suggested Group Art Unit:	
CD-ROM or CD-R:	None
Number of CD Disks:	
Number of copies of CDs:	
Sequence Submission?	
Computer Readable Form (CRF)?	
Number of Copies of CFR:	
Title:	Hot-Fill Bottle Having Flexible Portions
Attorney Docket Number:	CNST-3580
Request for Early Publication:	No
Request for Non-Publication:	No
Suggested Drawing Figure:	1
Total Drawing Sheets:	10
Small Entity?:	No
Latin name:	
Variety denomination name:	
Petition included?:	Yes
Petition Type:	Petition To Accept Color Drawings/Photographs
Licensed US Govt. Agency:	No
Contract or Grant Numbers:	No
Secrecy Order in Parent Appl.?:	No

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Postal or Zip Code of Mailing Address:	
Phone number:	
Fax number:	

Representative Information

Representative Customer No.:	23377

Domestic Priority Information

Application:	**Continuity Type:**	**Parent Application:**	**Parent Filing Date:**
This is	An application claiming the benefit under 35 USC 119(e)	60/558,790	April 1, 2004

Foreign Priority Information

Country:	**Application No.:**	**Filing Date:**	**Priority Claimed:**

Assignee Information

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